SLCD Controller Manual V2.21

August 14, 2009

For SLCD Hardware Revision G, RoHS Compliant

Note: the software included with this product is subject to a license agreement as described in this Manual.

Reach Technology, Inc.
www.reachtech.com
(510) 770-1417
sales@reachtech.com

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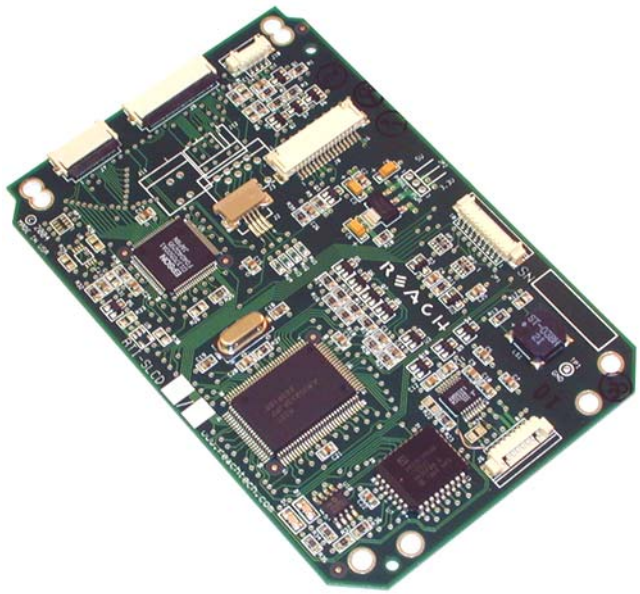
1. Introduction

1.1. *Overview*

The SLCD controller provides complete Graphical User Interface for embedded systems using QVGA or smaller LCD panels. Using the SLCD is simply the quickest way to generate a user interface without a lot of graphical programming. It has a small size to fit in space-constrained applications.



1.2. *Features*

- Drives either active (TFT) and passive (STN) displays
- Touch controller (4 wire resistive) on board
- Beeper for audible touch feedback and alarms
- 3" by 4.5" size, only 0.2" thick
- Low power (40mA typical at 5V)
- RS232 or TTL level interface up to 115200 baud
- User downloadable bitmaps with RLE compression (512Kb of flash memory)
- Backlight enable and brightness control
- Reasonable cost
- Supports either landscape or portrait mode display (firmware option)
- Can be modified for specific OEM requirements
- RoHS Compliant as of Jan 1, 2007
- Upgrade path to ARM9 200MHz version available (SLCD5)

1.3. *Dimensions - Rev G board*

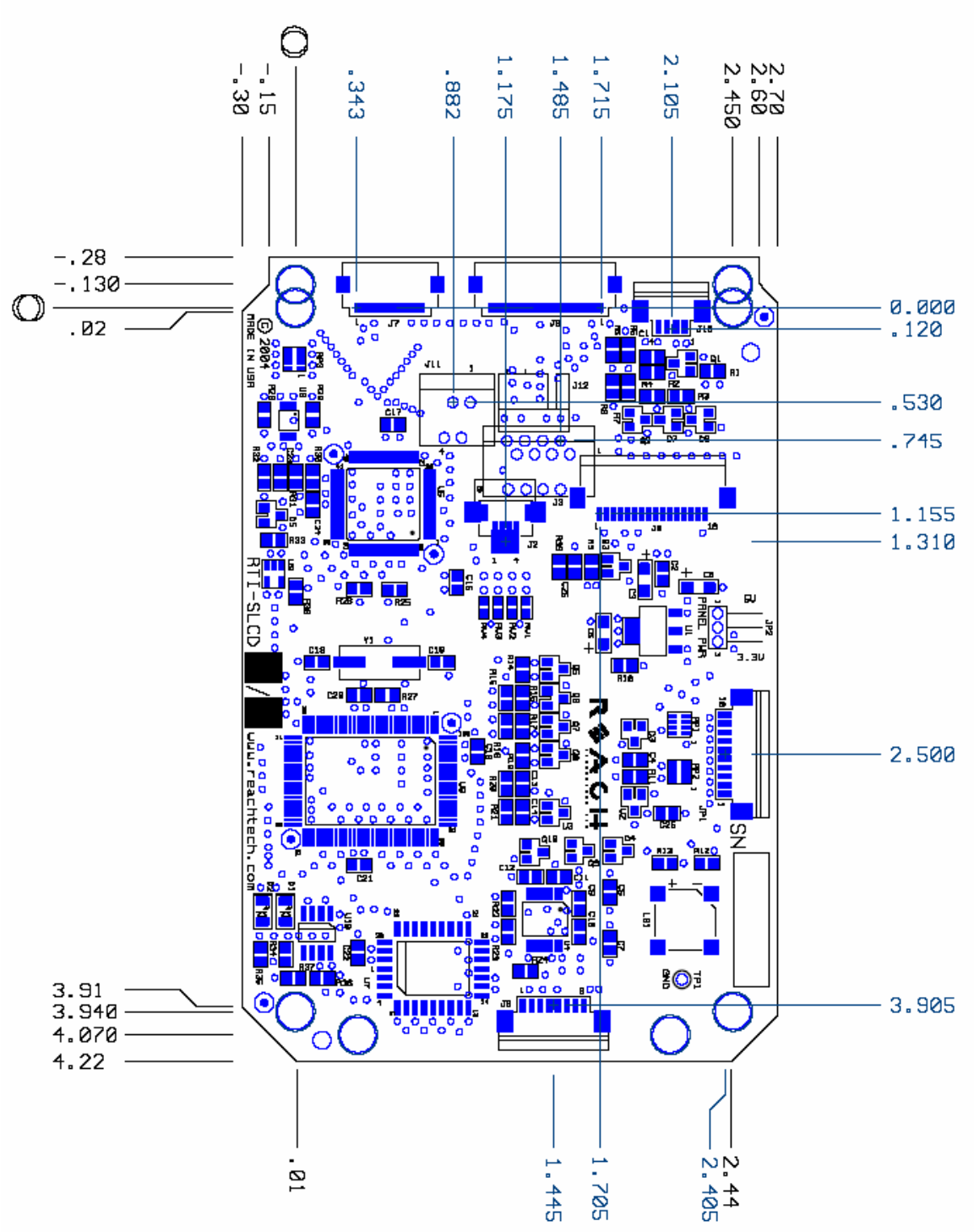


Figure 1: Rev G Board Physical Dimensions (inches)

1.4. *Electrical Characteristics*

The SLCD board takes in two voltages. One is simply passed though to the backlight inverter, and is typically either 5V or 12V. The SLCD itself requires 5V. *For other hardware options, contact Reach Technology Inc.*

The SLCD is designed for panels with VCC of 3.3V and that have built-in DC-DC converters and therefore do not need high positive or negative voltages. A list of compatible panels in provided in Appendix A.

Typical current draw is as follows:

State	**mA**
No panel attached, beeper quiet	40
No panel attached, beeper active	80

In general, the panel power and especially the panel backlight power requirements dominate the power budget.

1.5. *Environmental*

The standard SLCD controller is rated for commercial temperature operation of 0 to 70ºC. Industrial grade -40 to 85ºC version is available as a special order. Note that most LCD panels have a limited operating temperature range.

1.6. *Panel support*

The SLCD is factory programmed with panel configuration-specific firmware that includes panel type, orientation (landscape / portrait), backlight inverter I/O, and touch panel orientation. Panel types include passive color (CSTN), or active matrix (TFT). This manual describes different options and these may not apply depending on the firmware programmed on a given board. For example, there is contrast adjustment for passive panels but not for TFT panels. Please note that both landscape and portrait display modes cannot be supported by the same firmware; that is, the panel orientation cannot be changed “on-the-fly”.

1.7. *Upgrade options*

Reach has an upgrade to the SLCD that can provide more performance and 16 bit color. To provide for an upgrade, the four mounting holes that are symmetric with respect to the board outline are recommended for use.

2. Configuration Guide

2.1. *Power*

Note: The standard configuration is for 5V power input and 3.3V panel power. For other configurations, please contact Reach.

2.2. *Serial*

The SLCD has two serial ports. Either can be used to send commands to the board. COM0 is primarily used for RS232 communication, while COM1 supports 3.3V CMOS level signaling with RTS handshaking for an external transceiver such as RS485.

By default, serial communications is 115200 baud, 8 data bits, no parity, with 1 stop bit, and receive flow control via XON / XOFF. This can be changed by using a "power-on macro" which is described here.

2.3. *TFT Panel Orientation*

The SLCD can support QVGA TFT panels with standard 33 pin flat flex pinouts. Some panels also have signals for display orientation, called Right/Left and Up/Down. These signals are controlled by on-board resistors installed as follows. The star * indicates the factory default setting. See the pinout of connector J9 for the location of these signals.

Display	**Up/Down**	**Right/Left**
Normal Position on Screen*	High	Low
Mirror Vertically	Low	Low
Mirror Horizontally	High	High
Mirror Vertical and Horizontal	Low	High

Signal	**R6**	**R8**
Up/Down = High*	in	out
Up/Down = Low	out	in

Signal	**R5**	**R7**
Right/Left = Low*	out	in
Right/Left = High	in	out

2.4. *Grounding*

In order for the touch screen to work properly with a panel that has a CCFL backlight, the panel metal frame must be grounded to the SLCD ground. All SLCD mounting holes are connected to SLCD ground.

3. Connectors and Jumpers

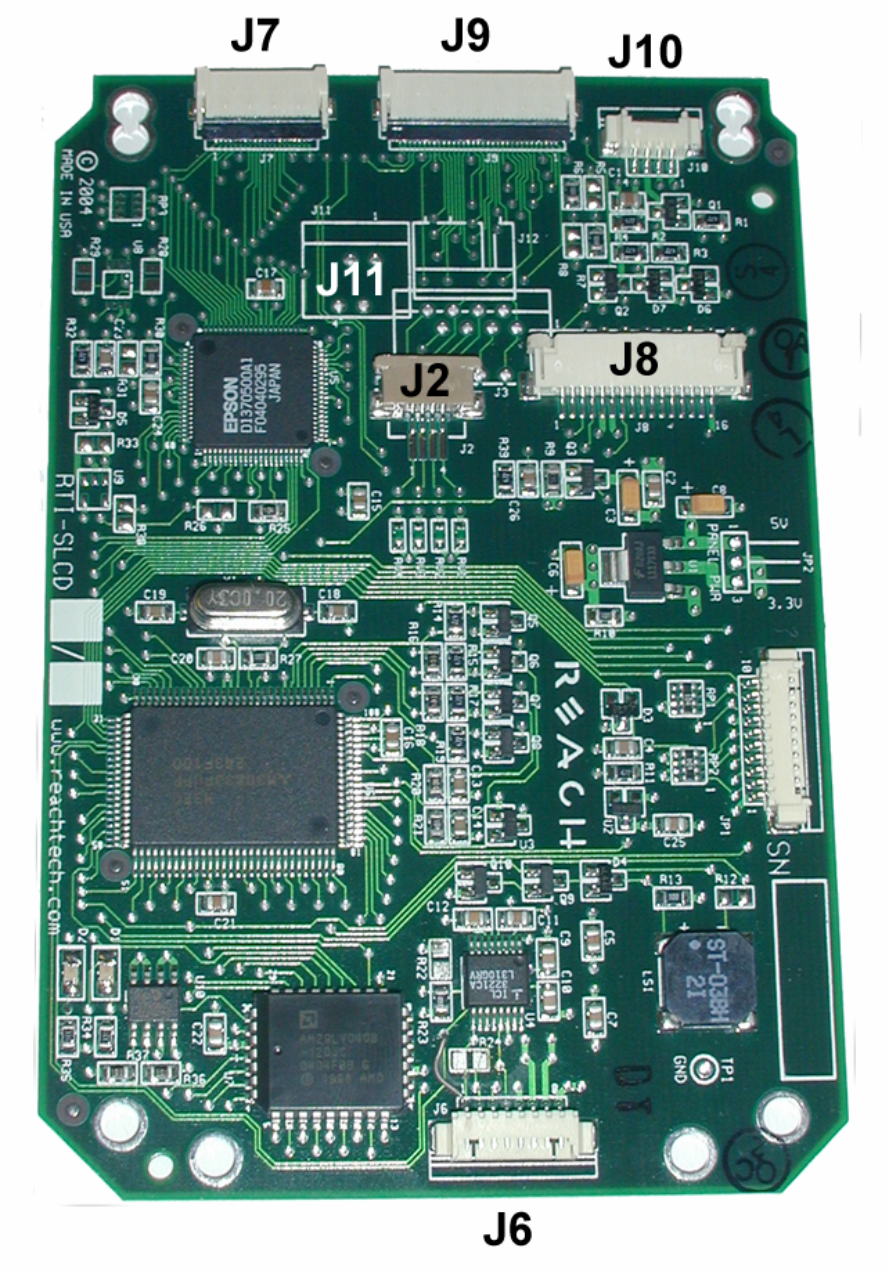


Figure 2: Connectors and Jumpers (J11 not installed)

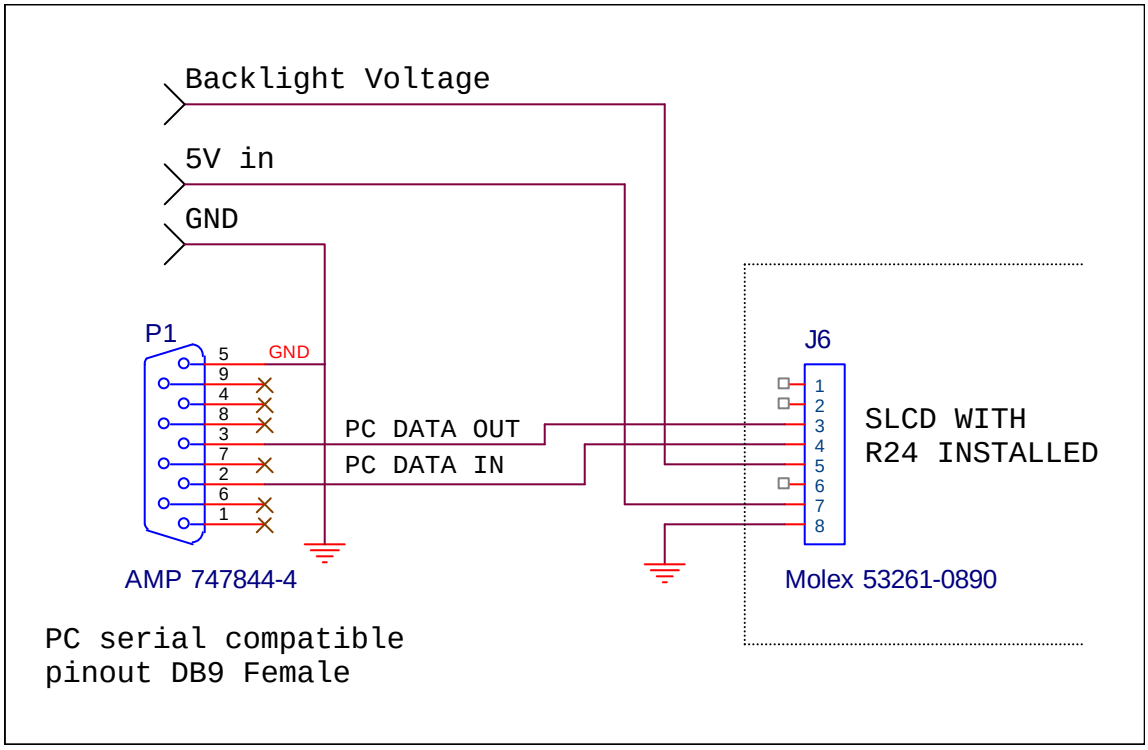
3.1. *J6 - Power and COM0 RS232 communications*

J6 8 Pin Molex 53261-0871 for Power and Communications

Pin	*RS232 Mode – R24 installed on board*
1	do not connect
2	do not connect
3	RS232 input *
4	RS232 output
5	Backlight power (Typ. 12V) input
6	3.3V out (reference only)
7	5V Input
8	GND (power and communications)

* RS232 input valid only if R24 installed as zero ohms. This is the factory default.

Typical connection from a PC is as follows:



3.2. *J2 - 4 Wire Touch***

J2 4 Pin Molex 52271-0469 or equivalent 1mm pitch bottom contact Zero-Insertion-Force Connector

Pin	*Signal*
1	X Right
2	Y Down
3	X Left
4	Y Up

3.3. *J11 - 4 Wire Touch***

J11 4 Pin Molex 39-51-3043 or equivalent 1.25mm pitch top contact Zero-Insertion-Force Connector

Pin	*Signal*
1	X Right
2	Y Down
3	X Left
4	Y Up

3.4. *J12 - 4 Wire Touch***

J12 4 Pin Molex 22-05-3041 or equivalent 0.1" pitch 0.025" square post right angle friction latch Connector

Pin	*Signal*
1	X Right
2	X Left
3	Y Down
4	Y Up

3.5. *J3 – 8 wire Touch Connector***

J3 8 Pin Molex 39-51-3083 1.25mm pitch Zero-Insertion-Force Connector

Pin	*Signal*
1	Y Down
2	Y Down reference
3	Y Up reference
4	Y Up
5	X Right
6	X Left
7	X Left reference
8	X Right reference

** Touch connectors are populated as required by SLCD Hardware Revision number. Specify revision at time of order.

3.6. *J7 - 20 pin 0.5mm Flat Flex LCD Connector*

J7 20 Pin Omron XF2M-2015-1A or equivalent 0.5mm pitch Zero-Insertion-Force Connector

Pin	*Signal*	*Pin*	*Signal*
1	LCD Frame Pulse	**11**	LCD Data 4
2	LCD Line Pulse	**12**	LCD Data 3
3	LCD Clock	**13**	LCD Data 2
4	LCD Display On (DISPOFF-)	**14**	LCD Data 1
5	LCD VCC	**15**	LCD Data 0
6	GND	**16**	Contrast Control 3
7	Contrast Voltage	**17**	LCD VCC
8	LCD Data 7	**18**	LCD VCC
9	LCD Data 6	**19**	GND
10	LCD Data 5	**20**	GND

3.7. *J8 - 16 pin 1mm Flat Flex LCD Connector*

J8 16 Pin 52207-1685 or equivalent 1mm top contact Zero-Insertion-Force Connector

Pin	*Signal*	*Pin*	*Signal*
1	LCD Frame Pulse	**9**	LCD Data 1
2	LCD Line Pulse	**10**	LCD Data 2
3	LCD Clock	**11**	LCD Data 3
4	LCD Display On (DISPOFF-)	**12**	LCD Data 4
5	LCD VCC	**13**	LCD Data 5
6	GND	**14**	LCD Data 6
7	Contrast Voltage	**15**	LCD Data 7
8	LCD Data 0	**16**	GND

3.8. *J9 - 33 pin 0.5mm Flat Flex LCD Connector*

J9 33 Pin Omron XF2H-3315-1LW or equivalent 0.5mm pitch Zero-Insertion-Force Connector

Pin	*Signal*	*Pin*	*Signal*
1	GND	**18**	Green 5
2	LCD Clock	**19**	GND
3	LCD Line Pulse	**20**	Blue 0 (= Blue 4)
4	LCD Frame Pulse	**21**	Blue 1 (= Blue 5)
5	GND	**22**	Blue 2
6	Red 0 (= Red 4)	**23**	Blue 3
7	Red 1 (= Red 5)	**24**	Blue 4
8	Red 2	**25**	Blue 5
9	Red 3	**26**	GND
10	Red 4	**27**	LCD DE
11	Red 5	**28**	LCD VCC
12	GND	**29**	LCD VCC
13	Green 0 (= Green 4)	**30**	R/L *
14	Green 1 (= Green 5)	**31**	U/D **
15	Green 2	**32**	GND
16	Green 3	**33**	GND
17	Green 4		

3.9. *J10 - Backlight / Inverter Control*

J10 4 Pin Molex 53261-0471

Pin	*Signal*
1	Backlight power (connected to J6 pin 5)
2	Ground
3	Backlight on/off control
4	Backlight brightness control

This connector is used to power and control the panel backlight. The sense of the on/off control (active high or low) is set in the firmware. The sense and range of the brightness voltage output is also set in the board firmware.

3.10. *JP1 – COM1 / Programming Header*

This connector is used *either* for updating the firmware of the SLCD, or for communicating using the COM1 serial port. It also has a hardware reset signal for the SLCD processor. (For firmware update, use the Reach P/N 42-0056 USB programmer.)

JP1 10 Pin Molex 53261-1071

Pin	*Signal*
1	VCC (typ. 3.3V) – can be used to power external transceiver
2	DE (active high) – use if needed to enable external 422 / 485 driver
3	Do not use
4	RxD1 – Com1 input
5	Do not use
6	Do not use
7	GND
8	RESET- input; drive low to hardware reset the SLCD processor
9	Do not use
10	TxD1 – Com1 output

TxD1, RxD1, DE, RESET- electrical specifications:

Input voltage	-0.3 / VCC+.03	Absolute Min / Max
Input voltage	0.8xVCC	High min
Input voltage	0.2xVCC	Low max
Output current High	1mA	Min, Vout = 0.9xVCC
Output current Low	-1mA	Min, Vout = 0.1xVCC

4. System Overview

4.1. *General SLCD Controller*

The SCLD acts as a "smart terminal" and is generally connected to a host processor that implements the desired Graphical User Interface (GUI) by issuing commands to the SLCD and processing button press responses from the SLCD. In this manual, the term "host" is used to describe the device connected to the SLCD.

Note that it is possible to use the SLCD as a host in a limited way by using macros and the OUTPUT command. If true “host” capabilities are needed, contact Reach Technology and ask for the beta firmware with embedded interpreter capability.

The SLCD board contains flash memory that is used for bitmap and macro storage. (This is sometimes referred to as “external” flash to distinguish it from the processor’s internal flash memory that stores the board firmware.) A bitmap is equivalent to a Windows ™ bitmap file – it is a rectangular image. Appendix D describes bitmaps and the BMPload program used to store these into the SLCD. Macros are a sequence of SLCD commands and are described in Appendix E.

4.2. *Overview - SLCD Evaluation Kits*

The SCLD is available in an evaluation kit form, and also as a complete enclosed unit. In the kit or enclosure, it comes pre-loaded with bitmaps and macros that implement a demo if the unit is powered on with the communications port looped back transmit to receive. This loopback is via external plug in the case of the enclosed unit, or via a jumper on the "PowerCom" board in the case of the unenclosed kit. The demo macro is #1. Appendix section E.6 contains a listing of the pre-loaded macro file. This can be used as an example of how to use macros.

The SLCD evaluation kit comes with hardware and firmware options loaded for the specific panel supported by the kit. It also includes a two-port DB9 interface board that makes it easier to connect to external host systems. One port can be used to download bitmaps from a PC while the other connects to the "host" computer.

4.2.1. Getting Started

The SLCD kit as shipped contains a demo that allows you to verify its functionality. Just plug the supplied power supply into the barrel connector on the triangular shaped PowerCom 4 board. The display should light up and lead you through various touch-activated screens.

Note that the demo is preloaded on the kit, and includes both bitmap files and a macro file. To best learn how the SLCD board and this kit works, start with simple commands using the serial interface and leave the creation and use of macros for later. **Appendix G of the SLCD manual provides a short tutorial.**

4.2.2. Connecting the kit to a PC

The kit should be connected to a PC so that the serial command interface can be experimented with. This is a preliminary step before the unit is connected to the embedded system that will control the display in the embedded system.. ***PLEASE NOTE: In order to communicate over the serial port, the Demo jumper JP1 on the PowerCom4 board must be removed.*** This jumper loops back transmit to receive on the serial port and this is what tells the SLCD to run the demo.

As shipped, the serial port is set to 115,200 baud, 8 bit, 1 start, 1 stop, no parity. There are two DB9 connectors on the "PowerCom 4" board. Connect the PC using a straight through cable to the DB9 marked "MAIN" (P1). A USB-to-serial adapter cable can also be used and plugged directly into this connector. ***Note: the Belkin USB-serial adapter has software compatibility issues and is not recommended; Reach recommends either Prolific or FTDI chip based adapters.***

Once connected, use HyperTerminal or similar terminal emulator to send and receive commands from the kit. HyperTerminal has limitations that can cause problems; specifically, some versions cannot send the "escape" character. We recommend ProComm Plus from Symantec, or RealTerm (shareware). ProComm has the advantage of being able to run scripts which can simulate the user interface on the SLCD using a PC.

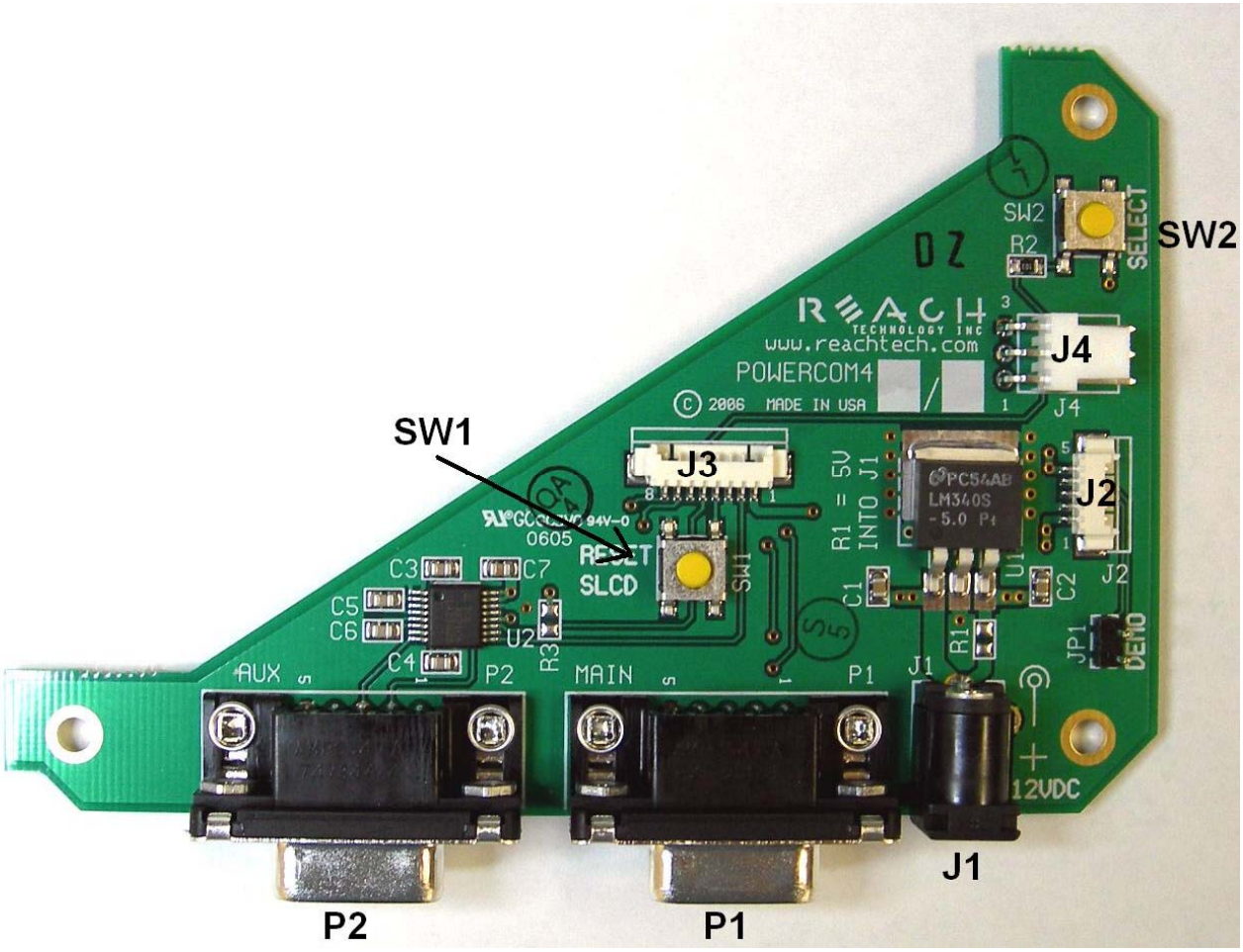
4.2.3. Developing the application GUI with an embedded controller as host

To develop the actual application, determine whether the host will interface via 3.3V CMOS levels or RS232 levels. Then connect the host accordingly to either the MAIN port on the PowerCom4 (RS232) or to JP1 (CMOS levels). Connect the other port to a PC. This way either the host or the PC can drive the SLCD. Typically the PC is used to experiment and determine what command is needed for a graphical interface, and to download new bitmaps and macros without having to disconnect the embedded system.

How this dual port connection works is this: the SLCD has a non-volatile memory which remembers which port is the “main” control port. This is selected via the “*com0main” or *com1main” commands. The other port is then the aux port. When the aux port receives three <return> characters in a row, it switches to become the main port. This way, the PC

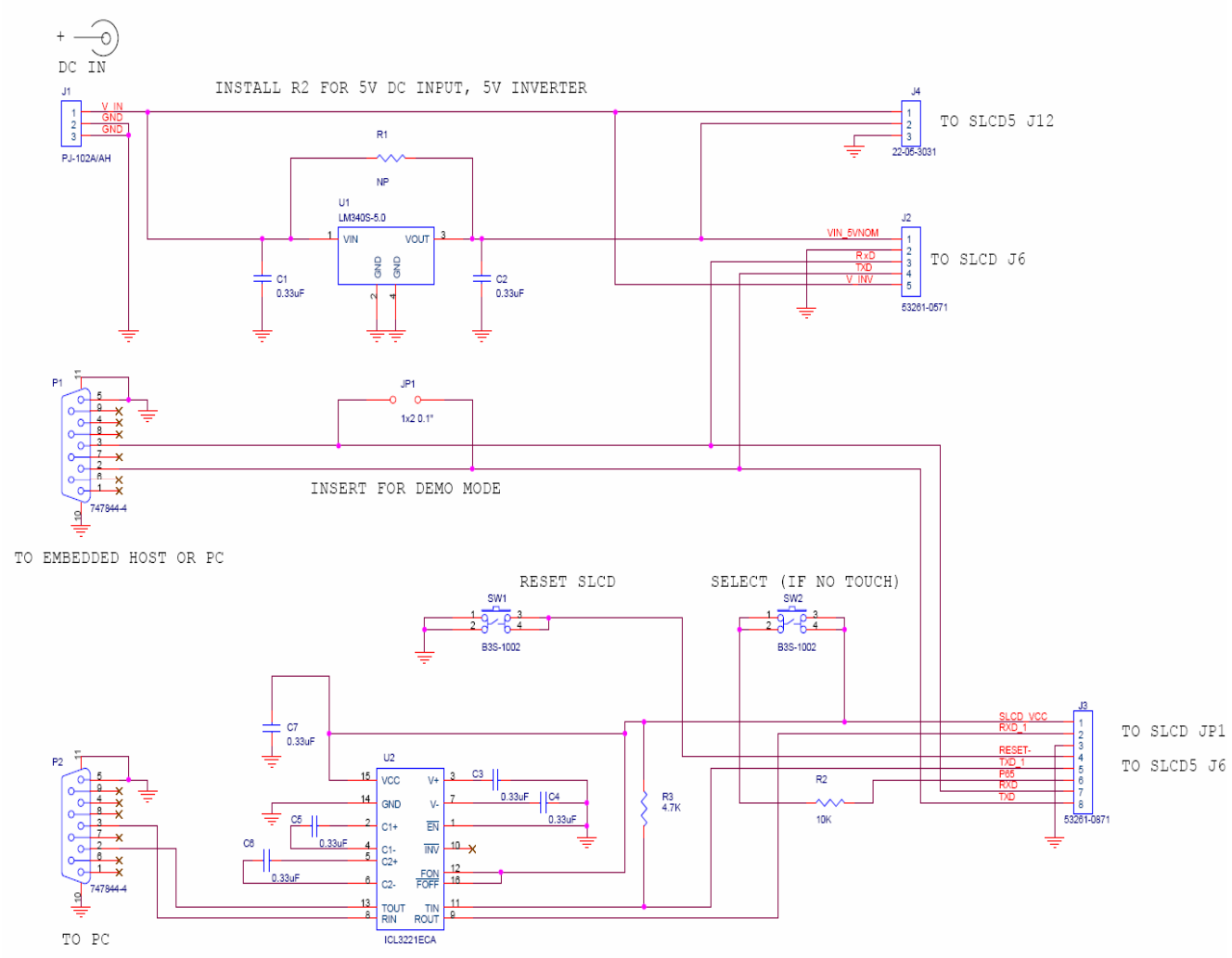
can take control of the SLCD communications channel and send commands or download new bitmaps. Use the reset button to simulate a power-on event which restores the main port as the default control port, or use the *prevCons command.

4.3. *PowerCom4 Board*



PowerCom4 Board

4.4. *PowerCom4 Schematic*



4.5. *Kit / PowerCom4 Operational Notes*

1. The unit default baud rate is 115200. The unit does not echo characters (for communications efficiency), so you must select "echo characters locally" or "half duplex" in your PC communications program. Also, all return strings are terminated by a <return> only, so you need to specify “add line feed to line return” as well.

2. The internal demo starts with an optional touch calibration. In order for the touch screen to work reliably ensure the LCD frame is grounded to the SLCD mounting holes.

3. The demo requires a certain set of bitmaps to be loaded. These are loaded as part of the kit. If these are not present, it will not run correctly. Copies of these are provided in the "BMPs and Macros" directory on the CD provided. Use the BMPload program and load the demo.lst and macros.mac files to restore the demo.

4. The SW1 “RESET” button on the PowerCom4 board resets the SLCD processor and performs the equivalent of a power-on reset.

5. The SW2 "SELECT” button on the PowerCom 4 board is intended for use with kits that don't have a touch screen, and is not implemented on a standard kit.

6. Jumper JP1 is the “DEMO” serial loopback jumper that is installed at the factory in order to automatically run the demo at power up. Remove the jumper prior to attempting serial communications with SLCD controller.

7. The J1 barrel connector is the external power supply connector for the development kit. For kits with 12VDC input it is 2.1mm, center pin positive. For 5VDC input kits it is 2.5mm center pin positive.

8. Connector J2 provides the communications path for the P1 “MAIN” RS232 serial port. It connects to J6 of the SLCD controller. Connector J2 also provides 5VDC power to the SLCD controller.

9. Connector J3 of the PowerCom4 board is the communications path for the P2 “AUX” rs232 serial port. It connects to JP1 of the SLCD controller. This provides the path for the “RESET”, and “SELECT” signal buttons. As well as the communications path for downloading of bitmaps and macros to the SLCD controller.

10. Connector J4 is reserved for future use.

4.6. *Communications Interface*

General

- Default communication is at a baud rate of 115200 with no parity, software (XON/XOFF) flow control, 8 bits of data, and 1 stop bit. The baud rate can be set to a different initial value on power-on by using the POWER-ON MACRO feature.
- Characters are not echoed and all responses end only with a <return> character (0x0d). This is done to maximize communications line efficiency.
- ASCII commands consist of a command (one or more ASCII characters) followed by the data associated with that command, followed by a carriage return. In this manual, the return character (value 0x0D, decimal 13) is signified by <return>.
- Binary commands consist of series of hex bytes. The general format is as follows, where each <…> descriptor is a single byte. Note that the first byte indicates the command length and there is no trailing <return>.

  <0x80+number of bytes to follow><command byte><data0><data1>…<data n>

- Screen pixel values start at the upper left-hand corner. This is point x=0, y=0. The lower right corner is point x=319, y=239 (landscape mode).
- The maximum length of any command including the termination character is 127 characters.

Compressed Command Syntax

- All ASCII commands are shown with a space after the command mnemonic, for example:

  `p <pixels>`

  This command sets the line drawing width. This space is optional in all commands where the first argument is numeric (e.g. not text display) and can be removed to reduce code space and transmission overhead. For example.

  `p2<return>`

  sets the line width to 2.

4.7. *SLCD Input Buffer Processing*

Input Buffer

The SLCD has a nominal 512 byte input circular buffer. As commands are received, they are queued in the buffer and executed first come first served. After a command has been processed, the SLCD issues a "prompt" character followed by a <return> indicating the success or failure of the command. The '>' prompt indicates success and the '!' prompt indicates failure. Failure can be due to either a syntax error or an out-of-bounds parameter. Depending on how long a command takes to execute, one or more commands may be stacked in the input buffer. The SLCD will issue a prompt for each command after it executes. These prompts may be issued while the host is sending a command to the SLCD (full duplex operation).

The purpose of the circular buffer is to provide overlapped command issue and execution with full duplex communication. If this is not needed, the host can wait for the prompt before sending another command.

The SLCD controller issues a prompt when it has finished processing a command. This includes the null command which is just a <return>.

There is no special "power-on" prompt supplied when the unit first powers on. To detect that the board is available for commands, the host should send a null command (single <return> character) and wait at least 10ms for a success prompt back. Alternatively the POWER-ON MACRO command / feature can be used together with the OUTPUT command to send a unique message indicating that the unit is up and running.

Flow Control

The SLCD implements software flow control using the XON (decimal 17) and XOFF (decimal 19) characters. When the circular buffer is approximately ¾ full, an XOFF is issued to the host. An XON is then issued when the buffer is approximately ¼ full. If the host cannot or does not want to accommodate software flow control, the cost can make sure that no more than 2 commands are outstanding at any time. Given that the maximum length of any command is 127 bytes, this guarantees that the host will not be sent an XOFF character.

Buffer Limit Discussion

The input buffer can become full and unable to accept more data in two scenarios, both of which should never happen in normal operation. This discussion is presented because buffer overflow issues have presented security and reliability problems in PC and internet

devices. The two scenarios are as follows. In both cases, the buffer limit event happens when the buffer is full and one more character is received and has to be thrown away.

Scenario #1: The host sends data that a) does not conform to the command specification, and b) keeps doing so until the buffer size limit is reached, and c) ignores the XOFF request from the SLCD. ASCII commands are limited to a total of 127 characters including the <return>. Input buffer limit will occur when enough data is sent without a <return> to fill the buffer. This indicates a flaw in the host protocol or a hardware failure (for example, the communication line is chattering).

Scenario #2: The host sends valid commands that take a long time to execute and ignores the XOFF request from the SLCD. The limit event can occur when the buffer is full of unexecuted commands.

In both of the previous cases, when the SLCD detects a buffer limit it does the following:

- Discards the received character that caused the limit event, and resets (flushes) the entire input buffer. This is done in an attempt to make the error obvious to the GUI user. If a buffer overflow occurs it is a serious system error.
- Sends an overflow prompt to the host. The overflow prompt is '^'<return>. That is, shift-6 or caret followed by a return.
- Sends an XON character to the host (matches the XOFF that was previously sent)

Prompt Summary

The SLCD can issue the following prompts. These are in addition to any result of a command or button press event.

- '>'<return> Indicates the a command has been executed successfully
- '!'<return> Indicates that the command had a syntax or parameter error
- '^'<return> Indicates that an input buffer full event occurred.
- '?'<return> Indicates that a transmission line error occurred. This includes parity, framing, and receive overrun errors

4.8. *Touch interface*

The SLCD contains a touch controller that interfaces to a four wire resistive touchscreen. Touch sensitive areas of the display are defined as either "hotspots" or "buttons". When either of these is pressed or released, the SLCD can either notify the host directly or execute a "macro", or both. A macro is a predefined sequence of SLCD commands.

Hotspot

A hotspot is an area of the display that is touch sensitive. There are two types of hotspots – visible and invisible. A visible hotspot is the standard type and when touched, the display area of the hotspot is color inverted (technically XOR'd with the foreground color) to provide a visual indication that a hotspot has been activated. An invisible hotspot does not provide any visual indication when touched.

The invisible hotspot is useful where a touch control is used to switch display screens. If a visible hotspot is used, and the host redraws the screen when the hotspot is pressed, the hotspot area can become inverted when the user removes their finger from the screen.

Button

A button is a touch sensitive area that has two bitmaps associated with it. These bitmaps correspond to the two states of the button – 1) normal /not pressed and 2) active / pressed. This allows a button to look like any GUI object including pushbuttons, toggle switches, radio buttons, check boxes, and so forth.

There are two major types of buttons: normal (momentary) and latching. A momentary button changes visual state only when pressed. This is like a momentary pushbutton or a keyboard key. A latching button is like a checkbox – press and release it once and the checkbox is filled, press and release again to clear it.

Host Notification

When a touch sensitive area is pressed or released, the SLCD can either notify the host, execute a macro or both. See the BUTTON DEFINE and TOUCH MACRO ASSIGN commands for details.

4.9. *Host input processing*

When integrated into a host environment, the SLCD sends prompts, touch activity notifications, and user-defined text to the host it is connected to. In general, all SLCD messages are terminated with a <return>.

There can be no guarantee as to the order of arrival for prompts, touch notifications, etc. It is guaranteed that the messages arrive complete and do not overwrite each other. The debounce timer for touch processing ensures that the host is not overwhelmed by touch notifications.

4.10. *LED indicators*

The SLCD board has two LEDs to indicate operational status.

D2 is closest to the board edge. It turns on when power is applied and the microcontroller is operating correctly. It can also be turned off and on via the SET LED command.

D1 is lit while the SLCD is executing a command or running a looping macro. It is useful to determine the activity level of the SLCD.

5. Software Command Reference

The software commands and utilities are described in a separate document, the SLCD, SLCD6 Software Reference Manual.

Appendix A - Panels compatible with the SLCD controller

The SLCD controller has been tested with the following panels:

A.1 *Hitachi SX14Q001[-ZZA] and SX14Q004[-ZZA]*

Color STN 5.7" (-ZZA for integrated touch screen)

3.3V operation

Plugs directly into SLCD Rev G

A.2 *Hitachi TX14D11VM1CAA-1 (CBA w/o touch)*

Color TFT 5.7", standard mounting, with or without touch

3.3V operation

Reach supplies a custom Flat Flex cable for SLCD Rev G

A.3 *Color 5.7" CSTN Kyocera KCG057QV1DC-G50*

Color STN 5.7" high brightness, integrated touch screen

3.3V operation

Directly supported by SLCD Rev G using 20 pin flat flex cable available from www.digikey.com

A.4 *Color 5.7" TFT Kyocera TCG057QV1AB-G00 or TCG057QV1AA-G00*

Color TFT 5.7" high brightness, integrated touch screen (AB)

3.3V operation

Plugs directly into SLCD Rev F using 33 pin flat flex cable available from Reach or www.axoncable.com

A.5 *Color 5.5" TFT NEC NL3224BC35-20*

5.5" high brightness, industrial applications, long lifecycle (5 year) availability

3.3V operation

Plugs directly into SLCD Rev G using 33 pin flat flex cable available from Reach or www.axoncable.com

A.6 *Color 5.7" CSTN Optrex F-51900NFU-FW-AC*

Color STN 5.7" low cost

3.3V operation

Requires adapter / custom flat flex cable from Reach

A.7 *Color 5.7" TFT Sharp LQ057Q3DC02*

Color TFT 5.7" high brightness

3.3V operation

Can use 3M touch screen

Plugs directly into SLCD Rev G using 33 pin flat flex cable available from Reach or www.axoncable.com

A.8 *Color TFT Sharp small*

LQ038Q5DR01 - 3.8" high brite

LQ050Q5DR01 - 5.0" high brite

Quadrangle (http://www.quadrangleproducts.com) can supply the 33 pin flat flex adapter cable for these panels.

Appendix B - Parts and suppliers for SLCD controller connections

B.1 *Connectors and cables for J6, J10*

The board connector is Molex type 53261-0890 (J6) and 53261-0490 (J10). The mating connector is made of two parts: a receptacle housing and crimp pins. A special tool is needed to make the crimps. Alternatively, custom cables can be purchased. See B.3 for cable vendors.

J6 Receptacle housing Molex P/N 51021-0800

J10 Receptacle housing Molex P/N 51021-0400

Crimp pins Molex 50079 or 50058

Prototype (small qty) crimp tool Molex 63811-0200

Production crimp tool Molex 63811-0000

All of the above are available from www.digikey.com

B.2 *Cables for J7, J9*

These connectors attach to flat flex cables that then attach to the display unit. These cables can be ordered from either

www.axoncable.com or www.quadrangleproducts.com or www.digikey.com

B.3 *Discrete wire cable vendors*

The cables needed for J6 and J10 can be specified and supplied as assembled cables by:

www.intcomptech.com

Appendix C - Ordering information

C.1 Contact Reach directly for ordering information.

Reach Technology Inc
4575 Cushing Parkway
Fremont, California 94538
(510) 770-1417
or
(503) 675-6464

Appendix D - Troubleshooting

D.1 *Touch unreliable or non-operative*

If the touch screen is unreliable or non-operative, do the following:

1. Make sure the metal shell of the display is connected to one of the SLCD mounting holes. This is the same as saying that the display case should be grounded to SLCD ground. Note that this only applies to displays with CCFL backlights not to EL or LED backlights.
2. Run the TOUCH CALIBRATE command, "tc". This will reset the calibration values and allow you to recalibrate the touch screen.

If after doing this the touch is still non-operative, check the touch connection into the SLCD board. Many touch panels use conductive ink that can be easily scraped off by too many or incorrect connector insertion cycles. If there are holes you can see through on the touch connector end where it plugs into the SLCD connector this is the problem.

To determine the accuracy and sensitivity of the touch, you can use the "debug" command as follows:

debug 1<return>

This puts an "X" on the screen whenever a valid touch is recognized. To turn off, use:

debug 0<return>

D.2 *Color STN (passive) display looks too dark, text is blue instead of black*

If the display does not look correct, it may be that the contrast has been set too far high or low. Use the "C=" command to set the contrast adjust at mid-point and the use the "C+" and "C-" commands to adjust the contrast for best color.

Appendix E – Using COM0 / J6 for 3.3V CMOS Interface

The SLCD serial port COM0 is typically used for communication using RS232 levels. However, by removing resistor R24, it can use 3.3V CMOS logic levels.

COM0 Logic Level Mode:

1. Resistor R24 (next to J6) must be removed.

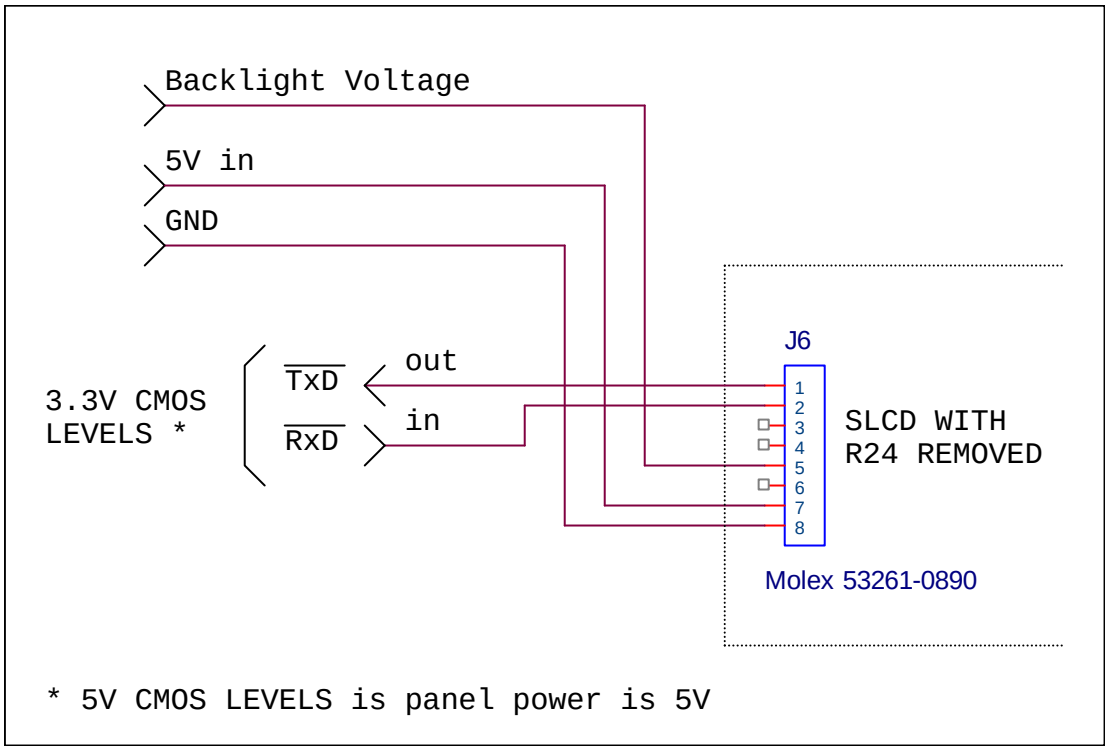
Connector J6 in Logic Level Mode:

J6 8 Pin Molex 53261-0890 for Power and Communications

Pin	*Logic level mode – R24 not installed*
1	TxD- output from microcontroller.
2	RxD- input to microcontroller *
3	do not connect
4	do not connect
5	Backlight power (Typ. 12V) input
6	3.3V out (reference only)
7	5V Input
8	GND (power and communications)

* R24 must be removed to avoid conflict with RS232 receiver.

Typical connection directly from a microcontroller is as follows:


Backlight Voltage
5V in
GND
3.3V CMOS
LEVELS *
TxD
RxD
out
in
J6
1
2
3
4
5
6
7
8
SLCD WITH
R24 REMOVED
Molex 53261-0890
* 5V CMOS LEVELS is panel power is 5V